METHODS AND EQUIPMENT FOR *Home Laundering*

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METHODS AND EQUIPMENT FOR HOME LAUNDERING

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OLD WAYS have given way to new in laundering as in other lines of household activity. Some housewives have turned the job over entirely to cooperative or commercial laundries. Many others still do it all at home. In between is a large group that sends out heavy pieces and does the remainder at home.

In modern house planning emphasis is laid on a compact laundry center adapted to the needs of the particular family. A room with modern equipment is the aim of the woman who does her own laundry. Other families may only need a corner for the equipment for washing and pressing personal belongings.

This bulletin gives suggestions for planning a laundry center and selecting equipment and supplies. Methods of laundering the standard kinds of fabrics and household articles, such as curtains, pillows, and blankets, are included. Farmers' Bulletin 1474, Stain Removal from Fabrics: Home Methods, discusses solvents, methods, and equipment for dealing with the common kinds of stains.

THE LAUNDRY CENTER

The laundry center is planned about the arrangements for washing. Set tubs or mechanical washers are placed in relation to water supply and drains. Modern housing aims to provide at least one set tub in all homes, supplemented where the washing load is heavy with mechanical equipment that reduces the time and fatigue and does away with much of the drudgery once thought unescapable in home laundry work.

The location of the laundry center is determined by the climate, the size of the house, and the relation of the laundry work to the other activities of the household. In some cases laundry and kitchen have to be combined, and in warm climates the porch may be utilized. A separate laundry room next to the kitchen is becoming increasingly popular for both urban and rural homes. In the farmhouse such a room is also an excellent place for preparing food products for market, for canning or preserving, or for doing the extra jobs that interfere with the regular kitchen routine.

Sometimes the location of plumbing determines the location for the laundry. If the laundry is directly below the kitchen or if the tubs and sink are near the same wall, the same pipes can be used for water supply and drainage.

Good lighting is necessary. Natural light is best directed on the work from the side. If the laundry is in the basement, the tubs are better set at right angles to the windows instead of against the wall underneath the windows. Artificial light should also be provided directly over both washing and ironing equipment.

Doors and windows should be so placed as to give thorough ventilation, on account of the steam, odors, and heat unavoidable in washing. The walls should be light in color and should be treated in such a way that they are not affected by steam. Several coats of good-quality oil paint give a satisfactory finish.

A laundry floor should be of material that wears well, is not too hard for the feet, does not soak water or get slippery when wet, and is easily cleaned. Of the materials used, wood and concrete are the most common. Concrete has the advantage that it is not affected by water, can be fitted with a drain, and is not slippery, but it is more fatiguing to stand on than wood. Rubber mats or low wooden platforms overcome this somewhat and are a safety precaution when electrical devices are used. For a wood or a concrete floor a satisfactory covering is linoleum fastened down with waterproof cement.

For good working conditions the equipment should be arranged to save steps and allow for two or more workers without interference. Figure 1 shows such a plan. The sorting table is near the entrance to the laundry and near the tubs or washing machine. The worker has a direct route from the washing center to the yard where the clothes are dried. The wheeled table is useful in returning the dried

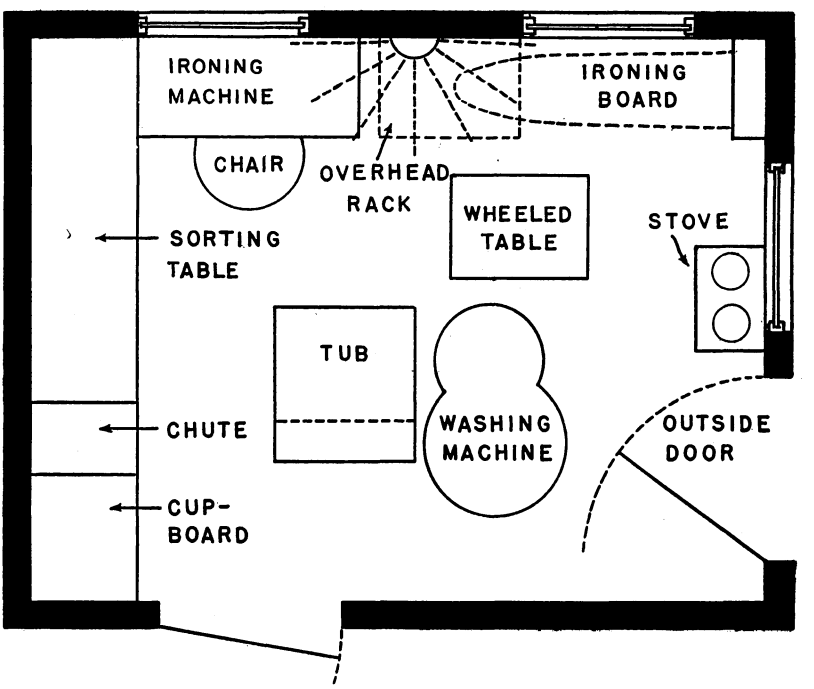

FIGURE 1.—A laundry room (10½ by 8 feet) with modern equipment placed for good routing of the work.

clothes to the table for folding and sprinkling, and then in conveying them to the ironer, which is in line with the door connecting the laundry with the rest of the house. The stove, for use in boiling clothes or preparing starch, is convenient to both washing and ironing equipment.

If a separate room for washing is not available, then consider carefully the actual space laundry equipment occupies. For example, if a machine is to be kept in the kitchen or on a porch used for many purposes, then it needs to be compact and easy to move. It may also provide much-needed additional table space.

When washing must be done in the kitchen, the clothes should be sorted elsewhere, and the machine or tubs so located that work in progress there does not interfere with food preparation. This may mean establishing a laundry center with separate faucets and drain pipes, preferably in a well-ventilated corner near the back door.

For the placing of ironing equipment if there is no separate laundry, there is wider choice, but for comfort and convenience it should be planned in relation to other work. An ironing board needs good lighting and a location off direct paths of travel. Wherever the ironing is done there should be a rack or table close at hand for the clothes.

EQUIPMENT

POWER WASHING MACHINES

A power washing machine usually means an electric washer with a self-contained motor that plugs into a standard convenience outlet. This can be used where the source of electricity is a power line or a home outfit, since the small motor on these machines, usually only one-half horsepower, does not make a heavy demand on the wires or current. Every electric machine should carry a label, giving the name of the manufacturer, the serial number of the machine, whether for direct or alternating current, and if the latter, the number of alternating cycles for which the machine is planned, and the voltage and wattage rating.

Where electricity is not available, machines driven by a one-half or five-eighths horsepower four-cycle air-cooled gasoline engine are in use. These are similar to the electric machines except for the difference in driving power. Portable motors can be used for other farm requirements, such as running water pumps, milking machines, cream separators, and butter churns, and in small workshops.

Portable motors are often attached to a belt-driven machine. The present tendency is to enclose these belts as a safety precaution and to provide automatic release of the clutch to stop the machine in case of accident. Where gearing has displaced the belt drive, the gearing and all moving parts, which might cause injury to the operator or to children, should be enclosed. This also reduces the attention needed to keep the machinery properly lubricated. Too much oiling as well as underoiling is a source of motor trouble. With sealed-in motors the manufacturer assumes the responsibility and specifies the number of months or years the original lubrication will last. Sealing-in moving parts also reduces the possibility of

oil or grease dripping down on the clothing from overhead bearings, as in the power wringer.

Though there are numerous makes of household power washing machines on the market, differing in the means employed to move the clothes or water or both, the underlying principle is the same—that for maximum cleansing the dirt must be loosened from the fabric by the combined action of water and soap or some other detergent and by the mechanical movement of the soiled clothes through the water. The machine that accomplishes these ends in the quickest time with the least harmful effect on the clothes is the machine that the housewife is looking for and that the manufacturer is constantly seeking to perfect. One device after another has been added until the modern machine is equipped to wash, rinse, and wring or extract the water from the clothes, leaving them ready for the line.

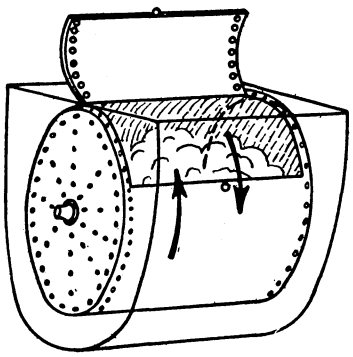

FIGURE 2.—Cylinder type washer.

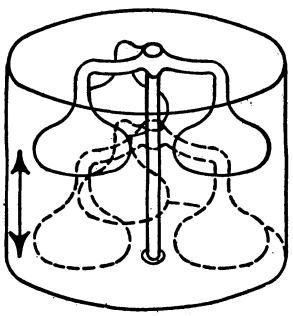

FIGURE 3.—Vacuum-cup device in washing machine.

So far as the washing principle goes, the present-day power machines fall into three types: The cylinder, the vacuum-cup, and the agitator, which is by far the most prevalent type on the market.

THE CYLINDER TYPE

Cylinder-type machines are similar to those used in commercial laundries. They usually have a perforated cylinder of metal or wood for the clothes, which revolves in an outer container holding the soap and water (fig. 2). On the inner surface the cylinder has projections or baffles that carry the clothes along as the cylinder revolves and then drops them back into the water when they reach the highest point. The direction in which the cylinder rotates is reversed periodically, the number of revolutions made in the same direction varying with different machines. Reversing the direction agitates the clothes more and helps to prevent their becoming tangled. Some cylinder machines also have a propeller that assists in agitating the clothes.

THE VACUUM-CUP TYPE

The vacuum-cup machine is a development of the funnel-on-a-stick washing device sometimes used in open tubs (fig. 3). An inverted funnel, often called a vacuum cup or cone, is plunged down on the clothes, forcing the water through them on the downward stroke. As the vacuum cup is lifted, the suction pulls the water back through the clothes. The simplest of these machines have only one cup, which moves up and down. Others have two, three, or four

cups. In some models a rotation of the shaft bearing the cups shifts their positions with each up or down movement, and thus brings new area of fabric under the action of the cups. Sometimes an adjustment is supplied for lowering the cups when the machine is operated with less than the maximum load.

THE AGITATOR TYPE

The agitator-type washer (fig. 4) gets its name from a device consisting of blades or vanes attached to a vertical shaft that revolves in the bottom of the tub and reverses its direction periodically, carrying the clothes with it and agitating the water at the same time. In different makes of washing machines this agitator goes by such varying names that there may be confusion as to the principle of operation. Aluminum is the metal generally used for the agitator, because it has the necessary rigidity and is light in weight. The relation of the cleansing efficiency of the machine to the number, size, and shape of the blades, to their position at the bottom of the tub or near the top of the water surface, and to their smoothness and solidity is still a problem for experimental research. Tests at the University of Nebraska have shown the desirability of using blunt blades to reduce the wear on the clothes. In some machines the effect of the old-fashioned washboard is simulated by making the blades corrugated, and in others by making the sides of the tub ribbed horizontally or vertically.

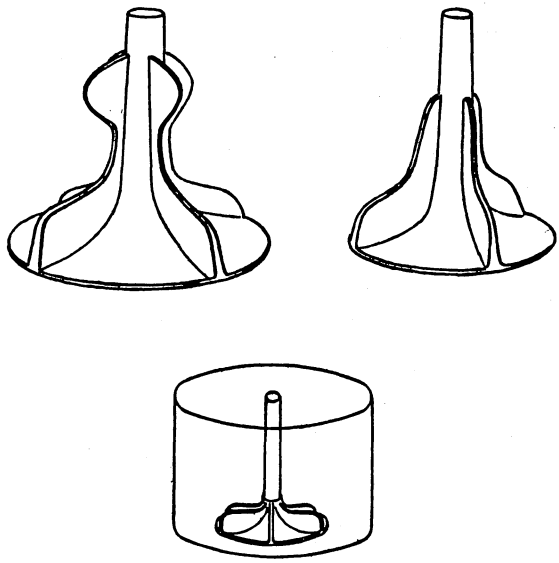

FIGURE 4.—Various forms of blades or vanes in the agitator type washer.

POINTS TO LOOK FOR IN SELECTING A WASHING MACHINE

PERFORMANCE, OPERATING COST, AND SAFETY

The performance of a washing machine is judged by how much washing it can do at one time and how well it does the job. The capacity of a machine is measured in terms of the pounds of clothes or the number of sheets the machine will wash effectively in one load. A moderate-sized machine holds between 5 and 8 pounds of dry clothes or 5 to 8 single sheets. The larger machines built for household use hold from 9 to 16 pounds. Small machines for lighter work, such as baby clothing or fine lingerie, have a capacity of only

2 pounds. The correct load of clothes, as specified by the manufacturer, should be used in any machine. Overloading is hard on the clothes and on the machine.

The water required by a machine is as important as the clothes capacity, especially if water is scarce or pumping or heating expensive. Generally speaking, the water capacity is in direct relation to the clothes capacity. The largest water requirement of any machine on the market at present is 25 gallons, but there are machines requiring less water than this that have a larger clothes capacity. The water line is marked in most machines. Too much water cuts down the efficiency of the washer and causes excessive splashing.

The washing efficiency of a washing machine depends on various factors besides the design, such as the kind and amount of soap or powder used, the temperature of the water, the types of clothing and soil, the care observed in loading the machine correctly, and the time the machine is operated for the given load. Research studies indicate that for maximum cleansing each machine has a maximum time which should not be exceeded. For most machines this time is between 5 and 10 minutes. The maximum time required for cleansing different types of clothing should be given in the instructions accompanying each machine.

The relation of durability and operating cost to the ultimate cost of a machine should be considered. Frequent repairs and high operating cost may prove more expensive than a slight additional initial cost. The availability of service and of extra parts and the ease of making repairs should be assured before buying a machine.

The framework of a washing machine must be of good steel or similar material, well welded and braced. The material that goes into its construction and the way the machine is put together govern its durability and safety. Nowhere in the machine should there be sharp edges of metal on which either clothing or fingers might be torn. This should be insisted on as a safety precaution.

Lightness of weight is a factor in shipping cost as well as in the case of moving the machine on the floor. Easily rolling casters facilitate moving, but some provision is desirable for locking the casters to prevent movement during the operation of the machine. This also decreases the noise, and quietness of operation is one of the points to consider in selecting a machine.

Other features that aid quiet operation and eliminate vibration are rubber casters, rubber-mounted tub covers and wringers, well-cut, enclosed gears, rubber-mounted motors, and, in the case of gasoline-driven machines, rubber-mounted tubs. The reduction of noise is effective in relieving nerve strain for the operator, and reducing the vibration also increases the durability of the machine and framework.

The insulation of an electric washing machine is important to safety. The outside of the machine must be electrically separated or insulated from any and all of the electrical connections. Otherwise the current will tend to leak off to the ground through the body of the machine and give disagreeable and even dangerous shocks to anyone touching the framework or tub while the current is on. This is especially dangerous for the operator since her hands are often wet and water is a good conductor of electricity. All wires

or terminal connections that might make possible contact with the metal of the main body of the machine must be well insulated. The wires themselves should be of the best quality, wrapped with good insulating material and encased in a thick, flexible rubber tubing to keep water from making the electrical connection between the two wires and causing short circuits. This rubber casing must be sufficiently flexible to allow for coiling the connecting cord while the machine is being stored between washing periods.

The connections and wire should be guaranteed for a specified time and should carry a written statement to this effect. The cooperation of the operator in renewing cords, in accordance with the life limitation put on by the manufacturer, will make for greater safety.

The convenience and the ease of locating the switches that turn off the power also contribute to the safety of a machine. The new machines are operated by hand levers or push buttons within easy reach, or by foot pedals in the case of gasoline motors.

MACHINE TUB AND CONNECTION FOR DRAINAGE

The moderate-priced machines have a single tub. The material differs, but one should be selected that is not subject to chipping, peeling, rusting, corrosion, or staining by alkali in the water. Porcelain-enamel tubs are in common use in electric washing machines, but aluminum, copper, nickel alloy, and stainless steel are also found. The porcelain enamel is not so easily stained as is a metal and is now guaranteed against chipping or peeling due to knocks or blows of the usual kind. When sharply struck, however, an enamel surface will splinter like glass and, besides continuing to splinter off, leaves the metal underneath exposed and subject to rust. Aluminum is light in weight and durable but is subject to stain from the alkali in soapy water. Copper is not so easily stained by hot soapy water, but it requires considerable work to keep it polished, and dull oxidized copper is very unattractive. Copper is moreover so good a conductor of heat that it is difficult to keep the water hot in a copper tub. Nickel alloy and stainless steel are light and strong and are being used increasingly, though they are expensive.

Some machines now have double-walled tubs to help hold the heat. Whether the difference in price between double- and single-walled tubs is justified is a question, since for the best cleansing effect the water should be changed frequently.

Sometimes the tub has a cover of the same material, but more often it is of some rustproof, lightweight metal, such as rustproof steel, aluminum, copper, or nickel alloy. The steel and aluminum covers are usually more highly polished or plated with cadmium or chromium so that the reflective power of the surface will help retain the heat in the tub. The cover usually either is set in a rubber rim on the tub or has a rubber rim of its own, to reduce noise due to vibration when the machine is in use. Some covers are hinged to the tub, but more often they are detachable. In the latter case suspending them on the edge of the tub adds to convenience.

Chromium or chrome nickel is increasing in favor for trim as it is more resistant to corrosion and more durable than nickel trim, besides requiring less cleaning.

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The ease of filling and emptying the tub is important in lessening fatigue during use and in planning the location of a washing machine. Where piped water and waste pipes are readily accessible, the simplest provision is a suitably located hose connection on a mixing faucet to carry either hot or cold water directly to the machine. This hose may be used as a syphon to empty the tub if no drainage outlet is provided, but most tubs now have an outlet at the bottom which permits draining by gravity. A hose connection from this outlet to a trapped floor drain simplifies the disposal of waste water. This is a flexible arrangement which makes possible the storage of the machine in an out-of-the-way corner when not in use. If a floor drain is not available, a convenient arrangement is a motor-driven pump built into the machine and operated by a lever or push button, which permits draining the tub into a set tub or sink by hanging the hose over the edge. In machines with an additional extracting tub this pump may be used also to deliver the soapy water from the extractor to the washing compartment. These motor-driven pumps are usually included in the higher-priced models or are available on many of the low-priced models at a somewhat increased cost.

POWER WRINGER OR EXTRACTOR

Power washing machines are equipped with either a power wringer or a centrifugal extractor or spinner drier. The power wringers make it necessary to handle the clothes separately as they are fed through the wringer. If the clothes, as wrung, go over into a separate tub, the suds water may be used for another batch of clothes. This is important where the water supply is limited and makes possible more efficient use of the suds as well as of time. In the machines with a separate extractor, the wet clothes are lifted out into this compartment for extraction and rinsing, and the soapy water may or may not be returned to the washing compartment.

The power wringer is an effective means of extracting the water from clothes. Power-driven geared wheels are connected with two rollers, one or both of which are of soft rubber. "Balloon" type rollers are increasing in favor as the softer surface prevents injury to buckles and buttons, produces less heavy creases in the fabric and wears on it less, and is at the same time just as effective in wringing out the water. Adequate means for directing waste water back into the tub without spilling over the edge should be provided on all wringers. Reversible rolls and double drainboards that can be adjusted to drain in either direction are supplied in most cases. These are more convenient when the tilt of the board reverses automatically as the rotation of the rollers is reversed.

The tension between the rollers is adjusted on some wringers by an automatic spring and on others by one or two screws. Where one screw controls both ends of the wringer it is simpler to adjust the pressure. If there are two screws care must be observed to turn the adjusting screws simultaneously and the same amount in order to get even pressure between the rolls.

To prevent the fingers or clothing of the operator from being caught in the rollers, some wringers have a safety feed device that keeps the fingers from coming in contact with the rolls, and most have some provision for releasing the pressure control on the rollers.

In buying wringers of this kind note whether the control device releases the rolls not only when the wringer is empty but also when bulky material puts more pressure between the rolls. This is a safeguard in case the hands are caught.

From the point of view of safety, every power wringer should have an automatic release that disconnects the power if too great a thickness is introduced between the rollers. This provides for the necessary release if an operator's finger or hand gets beyond the safety point when feeding clothes into the wringer, and it also protects the rollers from too great strain in wringing heavy materials.

When the rollers have been released they should be easy to reset. Resetting the pressure by the same control that starts the rolls moving again is sometimes provided for. Also both rolls should be easy to remove so that they can be repaired or replaced conveniently.

For convenience when using a machine with laundry tubs, the power wringer should be adjustable in different positions and should have provision for locking in at least four positions. Some have as many as eight positions.

The wringer should be of rigid construction and of sturdy rustproof material. The gearing should be enclosed, and the impossibility of oil leaking on the clothes should be assured.

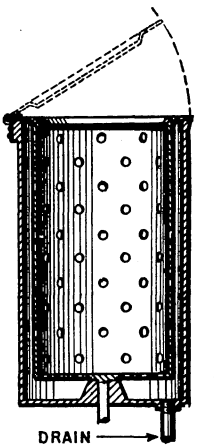

FIGURE 5.—Spinner drier or extractor.

Spinner driers or extractor tubs (fig. 5) are found only on the more expensive electric washing machines. These driers are based on the physical fact that revolving bodies tend to swing out as far as possible from the center of revolution. This means that the separate particles, whether separate pieces of clothing or water in the clothing, tend to fly out to the circumference of the rotating cylinder in which they are contained. The water passes out through small outlet holes provided in this rotating cylinder, leaving the clothes in the spinner basket "damp dry." This method removes a larger proportion of water than does the power wringer and saves time as well. It also reduces the breakage on buttons and the creasing of the clothes. Extractor tubs are usually made of porcelain enamel or aluminum with a smooth finish to prevent injury to the clothing or to the hands.

The weight of the clothes should be uniformly distributed around the extractor to obtain even motion. Uneven packing results in rough or wobbly motion and vibration as the spinning starts. In extractors with small diameters this vibration is decreased. Overloading the extractor and the resultant wear on the mechanism should be avoided.

A mechanical device connected with the cover of the centrifugal drier, making it impossible to remove the cover until the extractor stops spinning, further increases the safety of this device for extracting the water from the clothing.

In some machines a perforated spinning spherical metal basket in the tub of the machine is used for the washing, rinsing, and ex-

tracting. This obviates lifting the wet clothes from the washing compartment into another section for rinsing and bluing and then into a special extractor spinner.

CARE OF A WASHING MACHINE

Proper use and care will lengthen the life of a washing machine as well as of any other mechanical device.

Study the instructions furnished by the manufacturer of the machine and oil the machinery according to his directions. Do not lubricate or adjust any part of the washer while the cord is connected to the current outlet.

Cleanliness is of great importance, but to remove stains use only whiting or some other very fine scouring agent, not a coarse, harsh powder. Hot vinegar is also useful in removing obstinate stains. The greenish compound called verdigris, which often forms upon copper tubs, can be removed by a paste of whiting and oxalic acid (poison), or by a solution of soapsuds and ammonia. After using the machine, rinse it thoroughly with hot water, operate it for a short time, drain, and dry to prevent discoloration of the metal. Remove the cylinder if there is one and dry it separately. To keep the steel or iron frame from rusting, rub it occasionally with oil.

Between washdays leave the drain faucet open and prop the lid up an inch or two to allow free circulation of air and coil the connecting cord where it will not collect moisture or dirt.

WASHTUBS AND WASHBOARDS

In homes where the washing is done by hand at least two tubs, whether stationary or portable, are needed. The height of these tubs should be such that only bending from the hips is necessary, no stooping from the shoulders. Otherwise, the work is unnecessarily fatiguing. If persons of different height use the tubs, a small platform will allow for a more comfortable adjustment for the shorter ones.

With stationary tubs there should, if possible, be permanent hot- and cold-water pipes with faucets over each tub. If such installation is impossible, and the source of water is near enough, a flexible rubber hose can be used to fill the tubs. This hose can be converted into an emptying device by filling it with water, closing the ends, placing one end under the surface of the water in the tub and the other below the bottom level of the tub. This will siphon the water out of the tub. Emptying the tubs can be made more convenient by a waste-pipe connection to the outside, if direct plumbing is out of the question.

Stationary tubs should be of some durable, strong material that is easily cleaned. Slate, soapstone, and enameled iron are used, and more recently porcelain enamel on heavy-gage steel. With care enameled tubs are useful and durable. They are easy to clean and so light in color that they reflect light and the soil on the clothing can be more readily seen. Cement or similar composition is not satisfactory for washtubs because the surface is rough and easily damaged.

The once common fiber or wooden tubs are now rare but are still on the market for those who must depend on portable tubs. Wooden

tubs are heavy and the wet surface unpleasant to touch, but they will last longer than galvanized-iron tubs if they are kept wet while not in use. Galvanized-iron tubs are more common, but need care to prevent rusting and subsequent harm to the clothes. Iron is galvanized by coating with a thin film of zinc. Hard water is likely to deposit a zinc compound on these tubs, and washing sodas also attack this material. A paste of whiting and kerosene or a weak acid solution will remove this discoloration but should be carefully rinsed off after use.

A washboard is useful even when there is a washing machine, since neck bands, cuffs, and other parts of garments and also heavy materials need special rubbing to get out the soil ground into them by wear.

The necessary requirements of a good washboard are a substantial framework and no rough edges or sharp points that may catch the clothing or fingers. A worn board should be discarded before it has a chance to do any serious damage. A washboard should also be rustproof and should not come above the rim of the tub. If it is too high, it should be lowered by having its legs cut down. Washboards are often made of wood covered with corrugated tin or galvanized iron, but sometimes are made of a rustproof stainless metal or of glass.

A stiff brush and a table with a drain for carrying off the surplus water may be substituted for a washboard. However, a washboard is more effective than a brush if the clothing is not exceedingly soiled. A brush wears the clothing out more quickly.

HAND WRINGERS

A good hand wringer has some of the same requirements as a power wringer. But since it must be clamped on the side of either portable or stationary tubs and must fit either round or square tubs, the clamps must be adjustable and of sufficient width to hold the wringer straight and firm during use.

Metal clamps that would injure slate, soapstone, or porcelain tubs may be secured with wooden and rubber cross bars and blocks designed to protect the edge of the tub. There are extension clamps for use at the edge where the wringer is attached on tubs with broad framework.

An attempt to force too great a thickness through the wringer should always be avoided unless the pressure screws, supplied for giving variable space between the rollers, are first adjusted evenly to the desired looseness. No hand wringer can be expected to take a heavy woolen blanket without undue strain on the mechanism of the wringer and the back of the operator turning the handle.

Wringers, like washing machines, should be wiped dry or they will deteriorate. The rubber rollers may be wiped off with a cloth moistened with a few drops of kerosene to remove discoloration, but unless all trace of the kerosene is washed off afterwards the rubber will be made too soft for good work. The gears need oiling often enough to keep them from grinding, but overoiling is as unwise as underoiling. The wringer should be covered with a bag to protect it from dust when not in use.

LAUNDRY STOVES, CLOTHES BOILERS, AND STARCHING UTENSILS

If the clothes are boiled and must be transferred to and from the washer or tub, a low stove is most convenient. Combination stoves constructed for heating a tank of water with space on top for the clothes boiler are available. Two- and three-burner gas, gasoline, or electric hot plates are useful. The third burner makes possible the preparation of starch while the clothes are boiling.

Wash boilers of tinware, galvanized iron, copper, enamel, and stainless steel are manufactured. The stainless-steel and copper boilers are the most durable, but a tinware boiler with copper bottom and rim also gives good service and is less expensive. A tinware boiler should be dried with special care to prevent rusting and subsequent puncturing of the tin. A faucet soldered near the base is useful for emptying the boiler.

The starching utensils generally needed are a saucepan, a spoon, a measuring cup, a strainer, and a large pan or pail for mixing the starch and dipping the clothes. Kitchen utensils may be used if free from rust and other stains, but a separate set for this purpose is better and often more saving of time.

DRYING EQUIPMENT

CLOTHESLINES AND DRIERS

Cotton or hemp rope and galvanized or copper wire, either solid or twisted, are used as clotheslines. Rope or solid wire lines are better for thin materials since strands of wire in the woven cables may come loose and tear them. Many prefer a rope line, which is put up for use on washday and kept clean in a cupboard at other times. Boiling a new rope for a few minutes in soapy water softens it and lengthens its life. The wire lines are more permanent but must be wiped off with a damp cloth before being used and must be free from rust.

The clothesline attached by pulleys connecting a distant post with a window ledge or porch makes it possible to hang the clothes without leaving the porch or the house. A revolving outdoor drier with folding arms attached to a post is convenient in drying clothes in a compact space.

There are various kinds and types of devices for winding and storing clotheslines, from the small kitchen reel with a ratchet lock to large reels for use in the yard.

The usual form of prop to keep a line of clothes from dragging, is a long stick with one end crotched for the line to fit into and the other end spiked or pointed so it will stick into the ground firmly.

The best place to dry clothes is out of doors in clean air and sunshine. Where this is out of the question, as in city homes or during bad weather, some provision must be made for indoor drying. A good drier for a small home is a wooden frame equipped with rope and pulleys that will hoist it up to the ceiling easily. In larger establishments a cabinet heated by gas, electricity, gasoline, or even steam, or a large heated room, is sometimes provided.

CLOTHESPINS

The old-fashioned clothespin is cheap and serviceable for general use, provided it is made of sound smooth wood. Those with spring clips are usually of better quality although the metal wire may corrode and break. To prevent stooping, clothespins may be carried in an apron with a special pocket, or in a bag or basket that can be hooked onto the line and pushed along as the clothes are hung up.

CURTAIN STRETCHERS

A satisfactory curtain stretcher has a substantial frame, clamps adjusting the stretcher to different sizes, a scale on the stretcher frame to indicate the size in both directions, and rustproof pins or strips of metallic bristles that hold the edge of the fabric without leaving the scallops so commonly seen on freshly laundered curtains.

Curtain stretchers can be made at home by winding strips of wood with heavy cloth to which the curtain may be pinned. Or curtains may be pinned to a clean sheet stretched over a rug to keep them tight while drying.

CLOTHES SPRINKLERS

A spray attached to a cork fitted into a medium-sized bottle makes an excellent clothes sprinkler. A round whisk broom is also good for this purpose. These devices give a finer spray, sprinkle more evenly, and do the work in less time than dipping the hand into a bowl and scattering the drops off the ends of the fingers.

CLOTHES BASKETS

The containers for carrying wet, clean, or ironed clothes, or for collecting soiled clothing, may be baskets, hampers, or bags. Bags that may be washed with the clothing are the most sanitary, but enameled hampers are easily wiped out and are being used increasingly. Woven baskets are in common use for carrying clothes to and from the driers, and they should be lined with washable oilcloth, cloth, or with heavy paper to keep them from collecting dust. Oilcloth is the best when the basket is likely to rest on damp ground where the dirt and moisture can enter through the meshes. A small wheeled table, a child's wagon, or baby-buggy chassis is useful in carrying the clothes basket and in keeping the basket off the ground and at good level. A bag that hooks over the line, or better, is suspended by a rolling wheel, is also useful in preventing stooping when putting up the clothes to dry.

IRONING MACHINES

Ironing consists of smoothing out the wrinkles in a fabric and drying out the dampness, which aids in the smoothing process. For this both pressure and heat between two opposed surfaces are needed. Most household ironing machines are both heated and operated electrically, but there are a few large gas-heated household machines.

There are two types of ironing machines on the market, the presser and the rotary types (figs. 6 and 7). With a presser ironer the clothing is arranged on the board, the wrinkles are smoothed out or pleats

folded in place, and the shoe then brought down in position to iron them. On the rotary ironer the smoothing is done while the machine is operating.

THE PRESSER TYPE

The presser type is a modification of the old-fashioned flatiron and ironing board. Two equal-sized metal boards, one of which is heated and the other padded are brought together, thus heating and pressing simultaneously any article that has been spread out on the lower padded surface. These metal boards must have great tensile strength but should be light in weight to facilitate ironing and

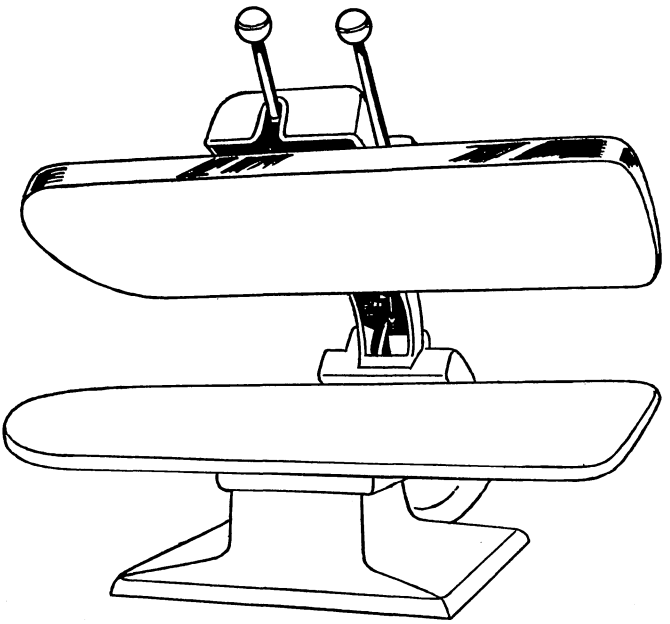

FIGURE 6.—Presser type of ironing machine.

storing the machine. They are supported on a base of cast aluminum which is sometimes attached to a steel table, but more often is built to be used on any small steady table. A steel table is supplied by the manufacturer at a small extra cost. The portable presser ironing machines must be especially light in weight and compact in size for convenience in moving and storing.

The presser board or shoe, which contains the heating element, is made of highly polished cast aluminum with a top cover of pressed steel or sheet aluminum, insulated from the heating elements to reduce loss of heat in this direction. There are sometimes two or three heating elements controlled by separate thermostats. The temperature ranges vary between 200 and 250° F. for low heat, and from 450 to 500° for the highest heat. Where thermostatic control is not provided, a heat indicator in front of the shoe is essential.

There is a hinged arm attached to the base and the shoe. Two levers control the action, one raises and lowers the shoe and one applies the pressure. These levers must be within easy reach of

the operator. The pressure possible in different makes of machines varies from 300 to 600 pounds. The shoe sometimes overhangs the ironing board to prevent creasing the clothes.

The ironing board is of cast aluminum, flexibly mounted to allow adjustment to varying thicknesses, and covered with a heavy pad of cotton or wool, a smooth pad of canton flannel, and a removable muslin cover.

THE ROTARY TYPE

In the rotary type one surface is in the form of a cylinder and the second in the form of a concave shoe, which fits over the curve of the cylinder or roll. Either the roll or the shoe is movable, and the two may be brought in contact with each other with varying degrees of pressure. The cylinder always revolves and carries the

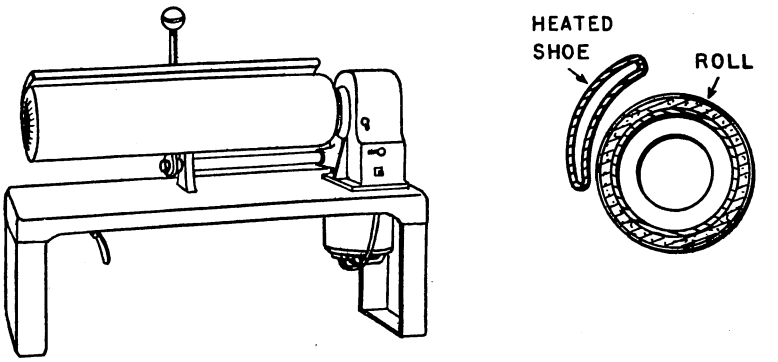

FIGURE 7.—Rotary type of ironing machine.

clothing between the two surfaces for pressing. The shoe is heated, sometimes uniformly over the entire length and sometimes with extra heat at the open end, where more ironing is done. In the latter case it is advisable to have some means of regulating the heat so it will be uniform when the entire length of the roll is used for flatwork. A few machines now provide for heating either end independently. This adds considerably to the efficiency of the ironer through protection against scorching and reduction of operating costs. The shoe can be easily tested for the uniformity of heating by the evenness of scorching of a sheet of white wrapping paper placed in the machine.

In some machines an automatic thermostatic control adjusts the temperature to a certain range as desirable, with switch settings for high, medium, and low heat. This device adds greatly to the safety as well as the convenience of an ironing machine.

The pressing surface of the shoe must be of highly polished rustproof and scratchproof metal that is a good conductor of heat. Chrome-plated steel is frequently used and on some machines alloys that conduct heat much faster than steel. Heat-insulation material is provided between the back of the shoe and the heating element to reflect the heat forward to the pressing surface. The surface must also be electrically insulated from the heating element to prevent danger of electric shock to the operator.

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The roll is made of heavy-gage rustproof metal, reinforced at the ends and covered with several layers of padding, so that while firm enough to allow efficient ironing, it is also soft and resilient enough so that buttons will not be broken. The outside is covered with a durable, washable muslin cover which should be easily removable.

The roll is attached to the frame at the right, with the other end fully open to allow for ease in ironing circular garments (fig. 8). Greater freedom in ironing is obtained when sufficient space is left at the right end, between the roll and the gear case, so this end of the roll is also unobstructed. There must also be sufficient space between the roll and the shoe, when the machine is not running, to allow freedom in arranging the clothing for ironing without danger of burned fingers and to provide for ease in cleaning.

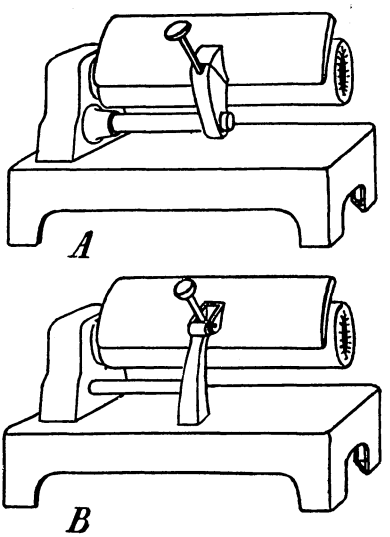

FIGURE 8.—Movable shoe: *A*, Supported at one end; *B*, supported at both middle and end.

The length of the roll varies. Twenty-six inches is considered adequate for average household use, but 30 inches, 32 inches, and lengths varying from 40 to 50 inches, are on the market. The price increases with the length, but where much wide flatwork is done, the increased cost of the longer models may be justified. Not only do the shorter models cost less and take up less space, but with them it is easier to keep the whole of the heated surface in use and therefore evenly heated.

The rotary ironing machine is usually built into a special table, but some small rolls are manufactured to be attached to the shaft of the washing machine after removing the power wringer. This does away with the necessity for a separate motor and frame for supporting the roll. But a support in feeding the clothes to the roll is lacking in these machines. This is a serious disadvantage in ironing for any length of time or where much heavy work is done, for the table takes the weight off the operator's arms and keeps the finished pieces off the floor so they are clean and unwrinkled after they are ironed.

When the ironing is started, the roll must start revolving to push clothing through the machine. Whatever starts and stops the machine should automatically move the shoe and roll into and out of contact with each other. This may be done by a hand or fingertip control, by a knee control, or by a foot lever. When the controls are so arranged that the operator's hands are both free during the ironing to manipulate the clothing, the work is more easily managed. In cases of accidental stopping of the motor there should be an emergency lever, conveniently located, for separating the shoe and roll instantly.

The switch or switches that control the heat are usually within easy reach at the right of the operator as she sits at the machine.

These switches must be turned on for some time before the heat is adequate for ironing. The manufacturer's directions should indicate the length of time needed.

An additional control for stopping the roll to allow for pressing or for drying especially damp parts of the clothing, without separating the roll and shoe, is provided in most machines. This control must be within easy reach of the operator and is usually located at the right near the heat switch.

The most important feature to look for in comparing rotary machines of the movable shoe type is the method of supporting this shoe, since this affects the durability of the machine. This shoe must keep its alinement with the roll if satisfactory ironing is to continue. The method of supporting the shoe varies (fig. 8). In some machines the shoe has a vertical bar bolted to its center which pivots about a horizontal bar rigidly connected with the table underneath, sometimes at both ends and sometimes attached only to the gear case at the inside end of the roll. In the latter machines attention should be paid to the rigidity of connection of the horizontal supporting bar at the far end, since the greatest strain on the machine during operation comes at this point. Where this strain is distributed over a larger area there is more rigidity, and the machine will not get out of alinement so easily because of the vibration of the machinery. Some manufacturers, therefore, make the horizontal bar larger at the inside end.

GENERAL POINTS IN THE CHOICE AND CARE OF AN IRONING MACHINE

In choosing an ironing machine the purchaser should decide what type and size of machine is most desirable on the basis of the work to be done and the space available for the machine. The ease and convenience of manipulating the ironing on the machine and of starting and stopping the machine should be noted, as well as the provision of safety devices for instant stopping of the machine and removal of the pressure to prevent injury to either the clothing or the operator in case of accidents.

The machine should be guaranteed to be shockproof and indicate that it has been tested to insure that the electrical insulation will not deteriorate quickly and will prevent leakage of electric current to the frame.

The ironer should be permanently marked with the manufacturer's name, the catalog or type number, a serial number, whether for alternating or direct current, or both, and the rating in volts and amperes or in volts and watts.

The durability of an ironing machine depends partly upon the care given it. The shoe must be kept clean by being rubbed with a wet cloth and wiped dry. When the shoe is starting to heat it should be rubbed lightly with paraffin or beeswax and any excess wax wiped off in order to avoid smearing the clothes. The muslin cover on the ironing board should be removed and washed frequently.

In ironing machines, as in washing machines, the tendency is for sealed-in lubrication so that the operator is relieved of the necessity of oiling. But it is advisable to have the motor checked by a reliable service company every year or two.

ELECTRIC HAND IRONS

The electric hand iron depends for its heat on the presence of a coil of wire of marked resistance to the passage of an electric current. This coil should be doubly insulated so that the electricity cannot pass into the main body of the iron and so that the heat is reflected downward into the sole plate and not allowed to escape upward through the pressure plate and handle. The more successfully the heat is concentrated in the bottom plate and prevented from reaching the top and handle of the iron, the more efficient is the iron (fig. 9).

In the old types of irons the coil, wrapped around a sheet of mica, is placed between the pressure and sole plates and separated from them by additional sheets of mica. In more recent models the coil is embedded in the sole plate in a plastic insulating material, thus concentrating most of the heat in the sole plate. The sole plate should be of perfectly smooth rustproof and scratchproof metal that is highly conductive of heat.

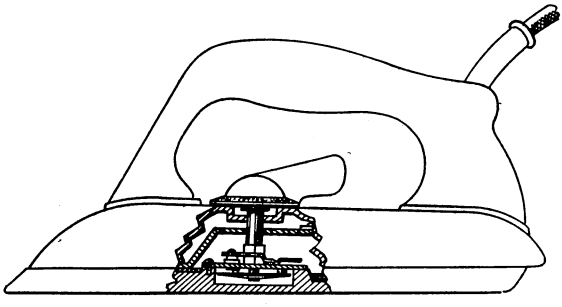

FIGURE 9.—Inner construction of an electric iron showing connection of thermostat switch to base plate.

In the newer irons a thermostat is directly connected with the sole plate and a dial and an adjustable switch on the top of the iron. The switch may be set on the off position or any one of several other positions. The dial is marked in terms of either temperatures or types of fabrics that require different temperatures for ironing, such as rayon, silk, wool, cotton, and linen. The automatic control feature then maintains the heat approximately at the same temperature for hours. It shuts off the iron when it reaches a maximum temperature, preventing overheating, and turns it on again when it has cooled to a certain point. This eliminates the necessity for either pulling out the plug or snapping off the outlet switch during the ironing period. This automatic feature has greatly reduced the fire hazard of electric irons and also produces more satisfactory work.

Elimination of the detachable plug on the iron in favor of a cord permanently attached has reduced the cost of repairs, since both plug and cord at this point have been sources of difficulty. Irons with a detachable plug should have a guard completely surrounding the plug, preventing any possible contact with the connections on the iron when adjusting the plug.

A bothersome feature of the electric iron is the tendency of the cord to tangle or mix up with the clothes being ironed. Some of the more recent models have the permanently connected outlet cord on the side. This lessens interference and prevents the iron from tipping and breaking the cord. A loop of string attached to the cord and suspended from a hook in the ceiling will suffice to elimi-

nate tangling, and special cord attachments that hold the cord up out of contact with the clothes are now obtainable.

Other modern features are chromium-plated surfaces, beveled edges with special grooves for ironing under buttons, thumb rests, better shaped large handles, and handles open at one end to facilitate ironing in difficult places like sleeves. The handle should be immovable about its axis of support.

Household irons vary in weight from 4 to 8 pounds, but there is a tendency towards decreasing the weight.

Irons of 800- and 1,000-watt rating for faster heating are preferable to those of 600 to 660 watts. The cost of operating an electric iron increases in proportion to the wattage rating since the cost is based on the number of watts used per hour. The greater heating speed and more continuous heat of the higher wattage iron is worth the extra cost of operation if there are heavy pieces and a lot of ironing. The low-wattage iron is adequate for small pieces.

IRONING BOARDS AND TABLES

Boards or table surfaces, if properly padded and covered, make excellent surfaces for ironing. The table is useful for large pieces of flatwork, but a board with one narrow end is preferable for clothing. A sleeveboard is also a convenience for blouses, children's garments, and other small articles.

An ironing board needs a firm, folding support. Boards hinged to the wall or door of a cupboard, with a prop attached, are convenient where there is need for conserving space. A shelf for the iron, sponging cloth, and other small equipment is easily included in such a cupboard (fig. 10). Or the board may be attached to a special panel inset in a door as an additional space-saving device.

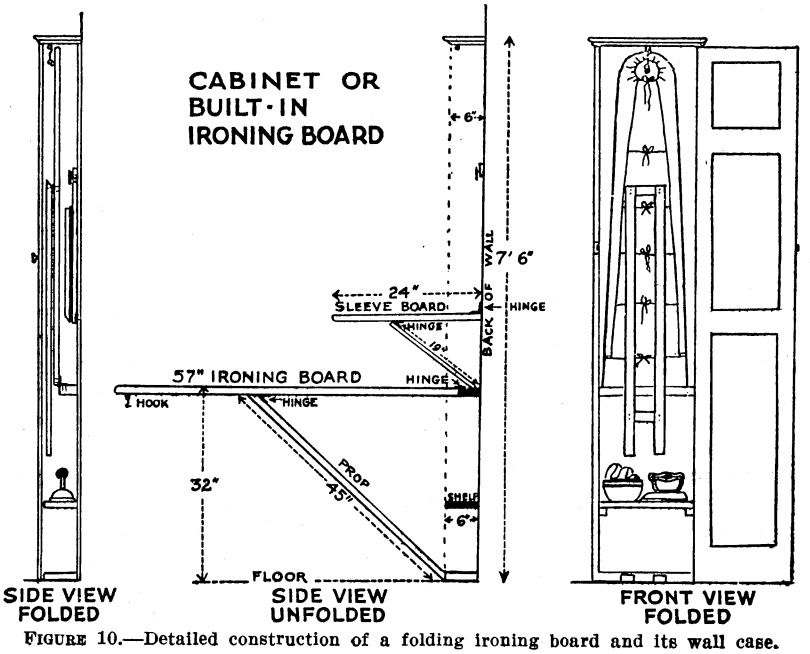

FIGURE 10.—Detailed construction of a folding ironing board and its wall case.

The padding of the ironing board or table may be double-faced cotton flannel used for silence cloths on dining tables, or an old blanket. Enough thicknesses of such material should be used to give the surface spring without making it too cushiony.

The covering over the padding may be old sheets, but new unbleached sheeting is better and not expensive since the width of the sheeting will make the length of the cover. Sailcloth is also excellent for this purpose. New covers, before using should be washed to remove starch and other finishing materials. Covers should be changed as soon as they show scorch because fabrics ironed on scorched covers are likely to acquire yellow stains. To make this changing easier, covers may have elastic all around the edge, or four pieces of tape sewed firmly to each side, or eyelets through which a lacing cord passes.

Some boards have a piece of tin or other metal about 8 inches wide tacked across the end on which the iron is to stand. Iron rests of metal and asbestos that slide over the edge of the board and are held in place by a springlike contrivance are now obtainable.

The ironing board or table should be so placed that force from the shoulder can be applied easily. A good average height is 31 or 32 inches. There are now on the market adjustable ironing boards which may be suited in height to the user either sitting or standing.

LAUNDRY SUPPLIES

WATER

If every home could have an abundance of perfectly pure water the home-laundry problem would be greatly simplified. However, as found in its natural state water always contains more or less dissolved and suspended material. This may consist of harmless gases and dirt that the rain has carried down in its passage through the air, or mineral compounds, which the water has acquired as it passed through the soil or over its surface, such as compounds of sodium, calcium, magnesium, and iron.

Sodium compounds cause no trouble in the laundry unless they are present in such quantities as to render the water extremely alkaline or saline. Common salt is the most widely distributed of these, and though ordinary soap will not lather in very salty water, such a condition would be exceptional in most communities. Salt water is not termed "hard."

Compounds of calcium, magnesium, and iron react with soap, forming new materials which do not dissolve in water and appear as a sticky, unpleasant scum. Thus not only is the soap destroyed and rendered no longer available for making suds, but the scum settles on the clothes in specks or gives them a gray tinge. Such water is spoken of as "hard." In the case of iron compounds often brown stains also are left.

There are two kinds of hardness in water. Some of this mineral matter decomposes when the water is boiled for a short time and forms insoluble substances that appear as the white scale so commonly seen on the inner surface of teakettles. This water is said to be temporarily hard. All other hardness is described as permanent, although it can be removed by chemical means or by boiling away all the water and condensing the steam, thus leaving the mineral matter.

Hardness is expressed in degrees. One degree of hardness is equivalent to 1 grain of calcium carbonate in 1 U. S. gallon of water. In reality calcium carbonate itself is so insoluble in water that it could not cause hardness, but it is taken as a standard for convenience. Commercial laundry owners usually consider water containing from 0° to 3° of hardness as being "soft", that containing from 3° to 6° "moderately hard", 6° to 18° "hard", and more than 18° "very hard."

METHODS OF SOFTENING AND IMPROVING WATER

As long as substances remain dissolved in water they are not likely to interfere with successful laundering. Water that is excessively alkaline, acid, or salty is an exception to this, because it would harm both clothes and hands. However, such conditions do not occur very often. They can be corrected best by distilling the water, but this is impractical in the home.

Substances not soluble in water may be deposited on the clothes as unsightly specks and spots. These may come from the sediment stirred up from the bottom of the tub or from the scum formed by the hardness of the water. Filtration and softening are remedies when such conditions exist.

Often objectionable materials can be easily filtered out, either with or without previous settling. Allowing the water to stand overnight is especially helpful in case it contains suspended iron compounds, or fastening a salt sack over the spout of the pump or faucet may solve the immediate problem. If the condition is serious, filters of charcoal, sand, and such materials may be worth installing.

The removal of calcium and magnesium compounds which are dissolved in water is called "softening" or "breaking."[1] This may be done by such mechanical means as boiling or distilling, and by the addition of chemicals. Distillation usually requires a rather large initial outlay and is not very practical for ordinary households. Boiling for a short time and then filtering off the insoluble compounds thus formed removes only temporary hardness, which may be a small part of the total.

As already stated, soap will remove calcium and magnesium compounds by forming a scum that can be strained off. However, this is a wasteful and expensive method of softening water, and the scum is difficult to remove effectively.

The use of washing soda is an inexpensive method. The soda reacts with the calcium salts and produces another calcium compound that falls out as a white solid. At the same time it also forms insoluble compounds with other elements, including the magnesium. All these solid materials so formed should be strained off. For moderately hard water 1 pound of the soda should be completely dissolved in a quart of water and 2 tablespoons of this used for each gallon of water. All of the soda should be carefully dissolved, for if solid particles are left they may adhere to the clothes and make holes in them. Lime is sometimes used in addition to washing soda, the process being spoken of as the "lime-soda method." However, a slight excess of lime causes extra difficulty and this method is not very successful in household practice. Lye is cheaper than washing soda and is often

[1] U. S. Dept. Agr., Farmers' Bull. 1448, Farmstead Water Supply.

substituted for it, but it is so excessively alkaline that it cannot be safely used for this purpose.

Trisodium phosphate, borax, and ammonia solution can be used also for softening water. Ammonia is a gas that is bought dissolved in water. So-called household ammonia is often a very weak solution, and a high price is paid for the water and the bottle. It is sometimes more economical to buy concentrated ammonia solution of a druggist and dilute it according to need. This should be done carefully and out of doors, however, as concentrated ammonia solutions are unpleasant to handle.

The great difficulty in using any of these methods is determining the quantity of softening agent required. This cannot be done accurately without knowing the degree of hardness of the water. The addition of too little washing soda or other softening agent for the amount of hardness does not remove it all, whereas the addition of too much renders the water more alkaline than may sometimes be advisable.

Accurate determinations of hardness are made at all water laboratories, and from their results calculations of the correction needed can be made. However, the following method will give a general idea of the condition of the water:

Make a solution of a good neutral soap in denatured or wood alcohol. This should be as strong as it is possible to make it without a jelly forming upon standing. Fill a small glass bottle about half full of water. Fit it with a tight cork or stopper and mark the level of the surface of the water by scratching the glass lightly with a file or by using a label. Add the soap solution drop by drop (counting the drops) until, when the bottle is shaken violently and placed upon its side, the suds forms an unbroken layer over the top of the water and remains that way for 1 minute by the clock. Repeat until the exact number of drops necessary to form the suds has been determined, being careful to use the same quantity of water each time. Compare the quantity of soap needed with that required for producing similar suds in fresh rain water. The difference is due to the hardness of the water. Vary the quantity of softening agent used each week per tub of water and repeat the above test. When the softened water requires no more soap than the rain water, record the quantity of softening agent placed in each tub of water and thereafter add that same amount.

Certain claylike substances known as zeolites are being used very effectively in water softening. These are in reality complex sodium compounds. When hard water is passed through a thick layer of such material a chemical change takes place that causes the calcium and magnesium to remain in the zeolite while sodium compounds pass into the water. When its power has been exhausted the zeolite may be quickly revived by passing a strong solution of common salt through it. The exchange of elements is thereby reversed, the calcium and magnesium compounds being thrown into the water again. The water containing these undesirable substances is discarded and the system again is ready to soften hard water.

Zeolites can usually be purchased only in connection with water-softening systems. These are being used extensively in commercial laundries and in private homes where the sources of water are such

that the household supply can be led through tanks of zeolite before being distributed through the house and where the water is so hard that the expense of installing such a system is justified. In cases where the zeolite can be obtained, homemade installations of this kind have been satisfactory.

SOAPS AND OTHER CLEANSING AGENTS

Soaps are usually made by heating or thoroughly emulsifying fats or oils with certain quantities of lye. Glycerin is also formed in the process and may be removed or left in the soap. On account of its value for other purposes it is usually not found in laundry and other less expensive soaps, but is taken out along with natural impurities by dissolving the mixture in water and "salting out." For this, large quantities of common salt are added, which cause the soap to fall out of the solution while the bulk of the impurities, the glycerin, and the salt remain dissolved. It is impracticable, if not impossible, to remove all of these various materials, and therefore soaps always contain at least traces of impurities and often more or less salt.

The value of a soap depends upon the character and quality of the fat used in its manufacture, the way the ingredients are mixed and handled, the foreign materials added, and upon so regulating the amount of fat and lye that there is an excess of neither. Too large a proportion of fat produces a soap that feels greasy and leaves traces of fat on the clothes. This is rarely true of commercial brands, but sometimes is of homemade soaps. An excess of lye produces what is called "a strong soap", and one that is likely to weaken cloth and injure the hands. When this is not the case the soap is called "neutral." The large variety of soaps on the market differ in all these ways, but chiefly in the water content and in the materials added to increase their value as cleansers, to act as water softeners, to cheapen them, or give them special properties.

Soap will absorb and hold large quantities of water, the amount depending somewhat on the kind of fat used in its manufacture. A moist soap dissolves easier than a dry one, but this power to hold water can be used by unscrupulous manufacturers to increase the weight of the soap with a cheap substitute. No one wishes to pay for soap and receive chiefly water. If a bar dissolves with great rapidity when being used, it very likely contains an excess of water.

Rosin is commonly found in laundry soaps. It can be used in place of part of the fat, because it will react with lye and form compounds which will lather and otherwise resemble soap. It therefore has cleansing power, but is not so valuable as good soap, and should not be present in quantities exceeding one-third of the fat. Larger quantities produce a disagreeable odor, give a sticky feeling, and are likely to color the clothes yellow. Rosin makes soaps softer, and it can therefore be used best in connection with tallow and other hard fats. Since it is cheaper than soap, it may be considered an adulterant unless sold at a correspondingly lower price. Almost all yellow laundry soaps contain rosin, although such color may be due to the grade of tallow or other fat used.

Sodium silicate (water glass) is another common addition. Most authorities agree that it increases the detergent or cleansing value

of the soap; but it, too, is cheaper, and should not be used in a way which will defraud the consumer. It also has value as a water softener.

Naphtha and other similar materials are sometimes added to assist in dissolving grease. They are useful in cold or lukewarm water, but evaporate too easily to be very helpful in connection with hot water.

Sodium borate, sodium carbonate (washing soda), and trisodium phosphate are sometimes added to soaps to increase their detergent value and to act as water softeners. However, when purchased in the soap, the price is usually greater than their value. It is cheaper to buy them separately. They are also objectionable in soap because they make it more alkaline, and may render it unfit for washing silks and woolens. Then, too, they increase the ability of the soap to hold water without appearing wet, and therefore make it possible to produce a soap containing an excessive amount of water.

Common salt and other inert and sometimes insoluble materials are often added to increase the weight of the bar or to give scouring properties. Salt should not be present in quantities greater than 2 to 3 percent. Soap must go into solution if it is to make suds and be of value in the laundry. Materials that will not dissolve, such as pumice and sand, are only valuable as scouring agents, and should not be present in laundry soaps.

A good laundry soap should be free from excessive water and uncombined fat, should have a minimum of uncombined alkali, and should not contain an excess of rosin, salt, or insoluble material. Methods of judging these points are given in the preceding paragraphs.

The kind of fabrics to be washed should be considered in selecting the soap. The best soap should be chosen for use on silks and woolens, since they are the most sensitive to alkalis. A mild soap should also be used on cotton materials that show a tendency to fade and on all delicate fabrics. On the other hand, it is uneconomical to use an expensive soap on ordinary cotton fabrics where a medium-priced soap would be satisfactory, or on very heavy, dirty materials which would be cleaned easier with a stronger soap. Many women ignore this and are either wasteful of good soaps or spoil their more delicate garments with poor ones.

Although most soap is cut in bars of convenient shape and size, chipped and flaked varieties are much used, both for special fabrics and in ordinary laundering, particularly when a washing machine is used. Their outstanding value lies in the ease with which they go in solution, the flaked being the better in this respect. As in the case of other laundry soaps, the chipped and flaked kinds should not, and most of them do not, contain excessive water or insoluble matter. It is also essential, since they are generally used with delicate fabrics, that they should not contain rosin and should be free from excessive alkali.

Cake soap can be rubbed into chips on a household grater, or, if very dry, put through a food chopper. This is a good way to use accumulated scraps.

Soap bark is perhaps the most valuable soap substitute. It is on the market in the form of chips, powder, or long, flat pieces. When extracted with hot water a solution containing a lather-forming

material called a saponin is obtained. This has detergent power, and, since it is very mild in its action, is suitable for delicate fabrics.

WASHING POWDERS

From the standpoint of value received, washing powders are about the most expensive of the laundry supplies. They usually contain powdered soap, washing soda, trisodium phosphate, borax, or inert scouring materials alone or in combination. Thus they are likely to be composed of both detergents and softening agents. Most washing powders contain an excessive amount of free alkali and should be used judiciously. In practically every case it is preferable to buy washing soda (sal soda), borax, or trisodium phosphate alone and not as part of a mixture of unknown composition. In that way there is no doubt about the strength being used and the cost is less.

BLUINGS

Bluing is used in laundering for the purpose of covering or neutralizing the yellowish tint of white fabrics. It does not remove the cause of the yellow tint, but merely produces a gray to which the eye is less sensitive and which appears white. In the case of soluble blues one of violet cast is required to give the desired effect.

There are two kinds of household bluing available, the soluble and the insoluble. The insoluble is found as balls, cubes, or powders. Some of these consist of starch tinted with blue dye, made into a paste with gum arabic, dried and cut into blocks, but most of them are ultramarine. The method of making this coloring matter, the composition, and even the shade vary. It is fast to light and alkalis, but is readily acted upon by weak acid solutions; aging does not affect it; and it gives a pleasing tint to the clothes. Since it does not dissolve in water but colors it by means of tiny particles held in suspension, there is sometimes difficulty in keeping it well mixed so that the clothes are blued evenly and without streaks. As with all insoluble bluings, the particles should be as fine and light as possible. Indigo, formerly used a great deal as a bluing, was of this type, but it is not used very commonly now.

Soluble blues are usually either soluble Prussian blue or any one of a great number of blue dyes. Prussian blue is inexpensive and gives a fairly permanent tint. Its chief disadvantage is that it is an iron compound, which is affected by alkalis. Therefore, when it is used on clothes from which alkaline soaps and washing powders have not been well rinsed, a yellow color may be produced in either of two ways. The bluing may be destroyed and the original yellow again revealed, or yellow iron compounds may be deposited on the fabric, leaving stains that are similar to those from rust and must be so treated. Such a bluing may be identified by adding a small quantity of concentrated ammonia solution or strong washing soda to a small portion and noting whether a reddish-brown substance forms.

There are an enormous number of blue dyes on the market which may be used for bluing. They are often called "aniline blues", just as dyes are often spoken of as aniline dyes. These usually have greater relative coloring power than other kinds of bluing, are fairly permanent, and give many different shades. The dye used should not be too fast to washing, as accumulated bluing may give the clothes an undesirable gray tint. Some of these dyes are sensitive

to acid, and if acid bleaches are to be used, a "nonsour" type should be selected.

In general, a bluing should give a bright, clear color of a faint violet-blue shade, its strength should correspond to its cost, and it should be either soluble in water or composed of such light particles that it will not settle out easily.

STARCHES AND OTHER FINISHES

Starching is an effort to replace the original finish which the textile manufacturer gave to the fabric, and which, except in the case of especially prepared permanent finishes, is removed by laundering. This finish not only stiffens the fabric, but leaves it smooth and pliable and gives it a certain "feel" which makes it attractive. Therefore, starching, as a laundry practice, should, if possible, produce all these results and not just stiffen the garment. In fact, the emphasis upon stiffness has caused many laundresses to use too much starch, giving the garment a laundered appearance.

The ideal starch penetrates well into the spaces between the fibers of the cloth, imparts a gloss when ironed, and takes up enough moisture to make the fabric soft and pliable. Starching also helps to keep the garment clean for a longer time by covering and holding down the tiny surface hairs that catch the dust. Dirt can be removed more easily from starched than from unstarched fabrics.

Laundry starch is the product of cereals, such as corn, wheat, and rice, or the potato, cassava root (tapioca), and the stems of the sago palm. Cornstarch is by far the most important and plentiful starch in this country and can be obtained in several grades of purity. For special results wheat, rice, and potato starches are used, either alone or in various combinations.

Each kind of starch forms a characteristic paste with boiling water, and even pastes made from the same kind of starch obtained at different times or from several sources may vary. The water used in making the paste also affects it. Soft water gives a thicker paste than hard water. The pastes of some starches require longer cooking than others to reach their maximum thickness. For example, potato starch reaches its maximum thickness in about 5 minutes and becomes thinner with longer cooking.

The stiffness of the paste, however, is not an indication of the stiffness that a starch will give to a fabric. For example, cornstarch, which forms a thinner paste than potato starch, gives a much stiffer finish. On the other hand wheat starch, which forms a very thin paste, gives an even stiffer and somewhat fuller finish to the fabric than cornstarch.

These differences are due to the way the starch paste penetrates the fabric. Wheat starch contains many starch granules that are small. When they are swollen in the cooked paste they can penetrate better between the fibers and yarns of the cloth than can the larger granules of some of the other starches. Potato starch which penetrates the least of these starches has large granules. When swollen, these are probably too large to penetrate and therefore rub off the yarns. Potato starch gives a very smooth soft finish to a fabric. At the other extreme is rice starch with its very small swollen granules that penetrate between the fibers thoroughly.

Potato, sago, and cassava starches form transparent pastes and they are suggested for use on dyed fabrics where other starches might dull the color.

Rice and potatoes cooked at home may furnish starch for laundering purposes. The water remaining after cooking one-half cup of rice in 2 quarts of water can be diluted to 1 quart by pouring boiling water over the rice, and contains sufficient starch to stiffen several small garments slightly. Likewise the water from boiled potatoes may be used. In fact, it has been found that frozen and even some types of decayed potatoes may be used advantageously for the production of starch.

However, since these starches are all more expensive and difficult to obtain than the cornstarch, it is impractical to consider their use for the regular family wash. Moreover, the ordinary cornstarch gives almost any of the desired effects when one or more of such softeners as paraffin, lard, beeswax, spermaceti, Japan wax, soap, tallow, and glycerin, and other substances such as borax, alum, gelatin, and glue are mixed with it in the correct proportions.

All natural starches are insoluble in cold water, but when mixed with water and heated the starch grains swell, some burst, and partially dissolve. The so-called soluble starches are usually formed by treating ordinary starch with acid or alkali. The extent to which they dissolve depends largely upon the length of time of treatment and the quantity of acid or alkali used. Many of the starches sold in packages under various trade names are cornstarch that has received treatment to make it partially soluble and thin boiling. They generally also contain one or more of the substances that are claimed to add to the gloss, pliability, softness, or whiteness of the starched fabric. Thus the various brands usually differ somewhat.

Since these partially soluble or thin-boiling starches do not make the thick paste typical of common raw starch, they have greater penetrating qualities. Thus they are less likely to rub and scale off during ironing and give a less "starchy" appearance to the fabric. Soluble starches do not possess as great stiffening power as the untreated starches. However borax is often added to these starches to increase their stiffening power on fabrics. No matter what starch or starch preparation is used, if the starching is done while the paste is very hot the penetration will be much better and the starch will be deposited more evenly upon the fabric. Directions for making and applying starch paste are given on pages 31 and 32.

Often it is desirable to use materials other than starch to produce special finishes on certain fabrics. A very dilute solution of gelatin or glue is excellent as a dressing for silk and for some of the finer cotton materials, such as organdies, voiles, and batistes. Dilute solutions of gum arabic and gum tragacanth may also be used. An almost new appearance can be obtained on wool by the use of these substances, and since they are transparent, they are especially desirable for finishing colored fabrics. Directions for their application are given on page 32. Cotton fabrics are often given a special finish in the mill to make them stiffer and crease-resistant. Such fabrics retain their stiffness on laundering and do not need additional starching. However some must be laundered carefully, much the same precaution being used as with silk and synthetic fabrics (pp. 37 and 38).

METHODS OF LAUNDERING

In many households Tuesday is replacing Monday as washday. This allows time for the extra duties that have accumulated during Sunday, and for mending, removing stains, and otherwise preparing the clothes for laundering. It is often preferable to set aside a special day for curtains, blankets, and such pieces requiring particular attention.

PREPARING CLOTHES FOR LAUNDERING

Mend all torn places, except in the feet of hosiery, and remove stains [2] before washing. Many small tears are made larger, and many otherwise removable stains are set by laundering. Turn all garments inside out. Place the cotton and linen together and the silk and wool in different piles. Separate the white from the colored in each pile, and also separate the very dirty from the slightly soiled. Notice whether rayon or other synthetic fibers are present in any of the fabrics or trimmings. Rayon is often much weakened by water and must be laundered as a very delicate material. Sort the clothes in a clean place. The practice of throwing soiled clothes on a dirty floor increases the work of laundering. A convenient division of clothes and order of washing is as follows, but when the washing is small some of the groups must of course be combined:

Cotton and linen:
- Table linen, doilies, centerpieces.
- Bed linen, dresser scarfs, slightly soiled towels.
- Thin white clothing.
- Heavy white clothing.
- Handkerchiefs.
- Towels.
- Slightly soiled light-colored garments.
- Slightly soiled dark-colored garments.
- Very dirty garments.

Hosiery.
Silks and synthetics.
Woolens.
Curtains, blankets, comforters, and special articles.

WHITE COTTONS AND LINENS

Since white cottons and linens make up the bulk of the family laundry, the general methods of washing and ironing are given for them, and directions for handling colored cottons and linens, woolens, silks, and other materials requiring special care are given separately.

SOAKING

Soaking clothes overnight, or even for a shorter time, loosens dirt, saves time, and lessens wear. Often excessive wear and expense are incurred by running a washing machine longer than would have been necessary if the clothing had been soaked beforehand. Cover the clothes with soft, lukewarm, soapy water, and use separate containers for the very dirty and only slightly soiled. Or wet, soap, roll, and place the clothes in a small quantity of water. This takes more time but is more effective.

[2] U. S. Dept. Agr., Farmers' Bull. 1474, Stain Removal from Fabrics: Home Methods.

FIRST SUDS

Remove the clothes from the water in which they have been soaked. Wash them either by hand or by machine in plenty of soapsuds as hot as the hand can bear. When the water becomes dirty drain it off and replace it with clean, hot suds.

Soap solution or soap jelly is more convenient than a soap bar, as it makes suds more quickly and cleans more evenly. Soap flakes or chips also dissolve rapidly. Soap solution may be made by dissolving a cake of soap in 3 quarts of hot water. One cake cut up and placed in 1 quart of water and heated gently until dissolved makes a good soap jelly.

Rubbing on a washboard should be gentle. The aim is to force the water through the fabric; therefore soiled places should not be rubbed until they are dry, but should be dipped after each rub if possible. Use the fleshy part of the hand. A small brush can be used to good advantage, even on rather delicate materials.

If a machine is used, follow the printed directions furnished with it, especially as to the quantity of water to be used and the weight of clothes to be washed in a load. Overloading is a frequent cause of dissatisfaction. Place delicate fabrics and small articles in net or thin muslin bags to protect them and facilitate handling.

After washing, wring the clothes as dry as possible. The garments should be lifted and guided through the rolls of the wringer; otherwise buttons and buckles are likely to injure the rubber and materially shorten the life of the wringer. Folding the buttons inside the fabric is also helpful.

SECOND SUDS

Washing through a second suds is advisable, but not always necessary.

BOILING

Clothes may be boiled if it is desired to disinfect them thoroughly. Under good conditions of washing, rinsing, and drying the boiling may be omitted.

If it is done, wring the clothes from the wash water, place in fresh, hot, soapy water, and boil them for 5 to 10 minutes. Longer boiling has a tendency to yellow white fabrics. As the clothes are lifted from the boiler allow them to drain as much as possible.

If the clothes are very dirty or yellowed, kerosene or turpentine (inflammable) may be added in the proportion of 1 to 6 tablespoons for a boilerful of water. The clothes must then be thoroughly rinsed in order to remove the odor. This is a serious difficulty if hard water is used. Turpentine is also sometimes injurious to the hands. An easier but more expensive method of whitening clothes is to add the juice of one or two lemons to a boilerful.

RINSING

After the clothes have been washed and boiled, rinse them thoroughly in plenty of hot, clear, soft water. Cold water hardens the soap and makes it more difficult to remove. Do not add bluing to this rinse water. It is essential that all soap and washing powders be removed from clothes before they are blued. Thorough rinsing

is of great importance. Soap and washing powders weaken and yellow fabrics when allowed to remain on them indefinitely. Wring the clothes from the rinse water as before.

BLEACHING

Clothes that are very much discolored from long storage or poor washing may require bleaching. Often merely moistening and spreading them on the grass in the sun is sufficient. If this is not effective, chemicals may be used with proper precautions. In all cases the bleaching chemicals should be carefully labeled and stored where not accessible to children. The suggestions given below are for white materials only. Avoid using chemical bleaching agents on dyed fabrics. All bleaching agents must be thoroughly rinsed from the fabrics after the desired results are obtained.

One of the most common bleaches for cotton and linen, generally called Javelle water, is prepared by dissolving 1 pound of washing soda in 1 quart of boiling water, cooling, and adding one-half pound of bleaching powder (chloride of lime) dissolved in 2 quarts of water. An earthenware jar or granite container is best. Allow the mixture to settle, preferably overnight, and dip off the top liquor or strain through several thicknesses of cheesecloth so that the solution for bleaching contains no solid particles. Store in tightly closed bottles. When needed, place one-half pint of this mixture in 1 gallon or more of cold or lukewarm water, and immerse the clothes. Allow them to remain until the desired amount of bleaching has been accomplished, although longer than half an hour is likely to be harmful to the fabric. Boiling in Javelle water may also weaken the material. Even the strongest of cotton or linen fabrics can be materially weakened by a too concentrated bleaching solution, high temperatures, or long treatment.

Rinse thoroughly in water, and if possible pass into an antichlor bath containing one-half ounce of sodium thiosulphate and one-fourth ounce of 36 percent acetic acid per gallon. Sodium thiosulphate ("hypo") is used in many homes where amateur photography is being done, or it can be obtained at the drug store.

In using Javelle water care must be taken with fabrics already weakened, such as curtains, and no garment containing silk or wool either as part of the fabric or as stitching or trimming, should be so bleached. Silk and wool dissolve in this solution. No fabric containing a colored design should be treated in this way, as many dyes are not fast to chlorine bleaches.

Hydrogen peroxide is an effective bleach, not harmful to most fabrics. It can be used in various concentrations, depending upon the amount of bleaching required. One pint to a gallon of water is an average quantity. A teaspoon of concentrated ammonia solution or of sodium perborate added to each gallon of the solution makes the action stronger.

Oxalic acid (poison) is a good general bleach, but is used chiefly when ink or rust stains are very widely scattered over the garment. One ounce per gallon of water is a good concentration. Use the solution cold or heated to a temperature that can be comfortably borne by the hand. Place the fabrics in it and leave until bleached. Ten minutes should be sufficient, unless the stains are very per-

sistent. Rinse the fabrics very thoroughly, and to neutralize any remaining acid pass them through a bath containing one-half ounce of borax per gallon or through a fairly strong solution of ammonia. Continue the rinsing with clear water until there is no danger of any of the acid being left in the fabric.

BLUING

A fabric that has been properly manufactured and always properly laundered does not need bluing. There are few of these in the average household, but too much rather than too little bluing is usually added. The various kinds of bluings are discussed on page 25, and the following precautions should be observed in using them:

Dissolve soluble powder bluing in a small quantity of water, and add it drop by drop to the tubful of clear water. Be sure that there are no undissolved particles. Put ball or block bluing into a bag of canton flannel or similar material and move it through the tub of cold water until the desired color is produced. Make insoluble powder bluing into a paste in a small vessel, and stir well while adding to the water.

Make bluing water just before it is to be used. If it is allowed to stand for a long time it is likely to streak the clothes. Test the shade by dipping in a small garment and holding it to the light, or by holding a little of the water in the hollow of the hand. Heavy fabrics require more bluing than thin ones. Stir all bluing water occasionally during use, especially that made with insoluble blues. Blue only a few pieces together, and do not let them soak in the bluing water. The ideal method is to dip them in and out one at a time. Never draw off the bluing water, leaving the clothes in the washer or tub; this may streak them. Clothes that have been overblued may be whitened by pouring boiling water over them or by boiling for a few moments. After bluing, wring the clothes as before.

STARCHING AND SPECIAL FINISHING

The amount of starch needed for garments depends on the kind and construction of fabric, the manner in which they are to be used, the stiffness desired, and whether they are wrung by machine or hand. If put through a wringer after starching, thicker paste is necessary to produce the desired stiffness than if wrung by hand. The wringer removes the excess starch more evenly and leaves the garment drier, but many pieces requiring starch may have trimmings that make it inadvisable to wring them by machine.

Because of the great variety of materials to be starched and the different methods used, an exact recipe cannot be given for making starch suitable for all purposes. The following is a good general one, and this paste can be thinned with hot water until it gives the stiffness desired for the fabric:

STARCH PASTE

2 to 6 tablespoons cornstarch.
⅛ cup cold water.
½ teaspoon lard, paraffin, or any white wax.
1 quart of boiling water.

Mix the starch and part of the cold water, and stir into the boiling water in a double boiler. Use the remaining water to rinse out the adhering starch. Add the lard or white wax, and cook for 15 to 20 minutes. Strain if lumps have formed. However, if care is taken there should be no lumps.

Suggestions for the use of other starches, such as wheat, rice, and potato, for special effects are given on pages 26 and 27.

Starch garments wrong side out, and leave them so until they are sprinkled. For white clothes use the starch as hot as the hands can stand. Hot starch penetrates better and more evenly, and does not leave glazed spots when ironed. Keep the bulk of the starch hot and use only a part of it at a time, replacing it frequently when it becomes cold and thin. More satisfactory results are obtained by having two pans of starch, besides the reserve supply. Dilute one with enough water to make a good paste for the thinner materials, and keep the other sufficiently thick for the heavier.

Starch first those garments which are to be stiffest. Garments wrung very dry before starching will be stiffer than wetter ones. Directions for starching colored fabrics are given on page 35. Prepared starches are sold for use in cold starching and the directions given on the package should be carefully followed.

Special finishes (table 1) are often used on such fabrics as voiles, organdies, batistes, and silks, to restore their crisp, new appearance. Dilute solutions of gelatin, gum arabic, and gum tragacanth are all good for this purpose. Avoid using too much of any one of them, or it will give a sticky feel to the fabric. The following table gives the approximate quantity of each of these substances to be used with a pint of water in making the stock solution, and the quantity of hot water with which to dilute it at the time of use. A little borax added to the solution when first made helps to preserve it.

TABLE 1.—*Special finishes for delicate fabrics*

Material	Quantity used	Water	Dilution
	Ounce	*Pint*	
Gelatin	1	1	1 part solution to 8 to 15 parts hot water.
Gum arabic	1	1	1 part solution to 5 to 10 parts hot water.
Gum tragacanth	½	1	1 part solution to 8 to 12 parts hot water.

Add the cold water to the gelatin or gum and heat until it has dissolved. Dilute with hot water, the quantity depending on the kind of material and the stiffness desired.

Directions for dressing wool are given on page 36, and for finishing silk on page 37.

HANGING AND DRYING

Dry the clothes outdoors if possible. Sunlight is an excellent bleach.

If the clothesline has been left out, wipe it carefully with a damp cloth before using. A cloth moistened with kerosene is excellent to remove soot and dirt, but the remaining traces of the oil should be removed with a dry cloth to prevent stains. Clothespins must be perfectly clean.

Hang garments on the straight of the goods and by their bands where possible. Sheets and other large pieces should be placed from a fourth to a half over the line and fastened securely in three or four places. Group similar garments together. Removing the clothes from the line in a systematic manner and folding the straight pieces before placing them in the basket will save time later, especially if some are to be put away unironed.

SPRINKLING

Sprinkle the clothes evenly and thoroughly with warm water. Pull the garments into shape; fold, and roll. Cover snugly with a clean cloth and allow to stand for at least half an hour, so that the dampness will become more evenly distributed. Clothes may be allowed to stand overnight if there is no danger of mildewing.

IRONING

Use a clean, hot iron as heavy as can be handled comfortably. To keep the iron clean, rub occasionally with wax or paraffin. An iron is hot enough to use when it "spats" when touched with a moistened finger. Too cool an iron may leave a rust stain. With starched clothes the iron must be hot enough to glaze the starch; otherwise it will stick and discolor the fabric.

Iron with the thread of the goods and until the garment is dry. Otherwise it will have a puckered appearance. Iron first those parts of the garment that will hang off the board while the rest is being ironed. For example, when ironing a blouse or a man's shirt, iron the cuffs and sleeves first, then the collar, and then, beginning with one side of the back or the front (depending on where the garment fastens), continue around to the other side. After ironing a garment look it over carefully and press again where needed. Gloss on hems, tucks, and seams can be removed by sponging lightly with a moist cloth. Scorch is usually removed by moistening the fabric and exposing it to strong sunlight, although bleaches are sometimes necessary.

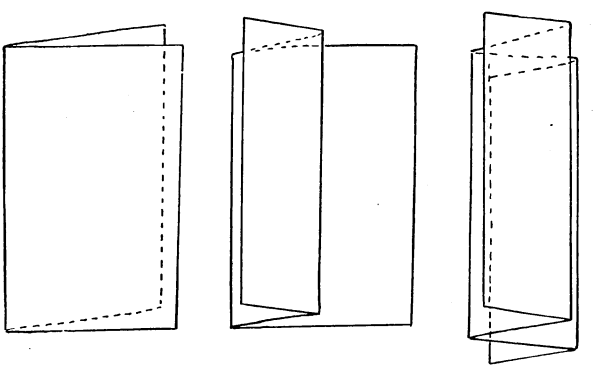

FIGURE 11.—Method of folding tablecloths and other flat pieces.

Iron clothes on the right side, except when it is desired especially to bring out the pattern of the fabric. Embroidery appears best when ironed on the wrong side on a thick, soft pad. Cotton-lace dresses often look best when ironed dry on the wrong side. Flat laces are sewed or pinned in place on a cloth or pad before washing, and do not require ironing.

Directions for operating an ironing machine can always be obtained from the dealer when it is purchased.

AIRING AND FOLDING

All articles should be folded as little as possible, but this depends, of course, upon the space available for storing them. In general, fold pieces lengthwise in the direction of the warp and then very lightly crosswise until a convenient size is reached.

A method of folding tablecloths and sheets is shown in figure 11. They should then be hung on the clothesrack until thoroughly dry before being folded crosswise. Do not iron in the crosswise folds. If arrangements can be made for storage, one lengthwise fold can be made and the tablecloth then rolled on a short pole or roll of paper. Centerpieces and tray cloths should always be rolled.

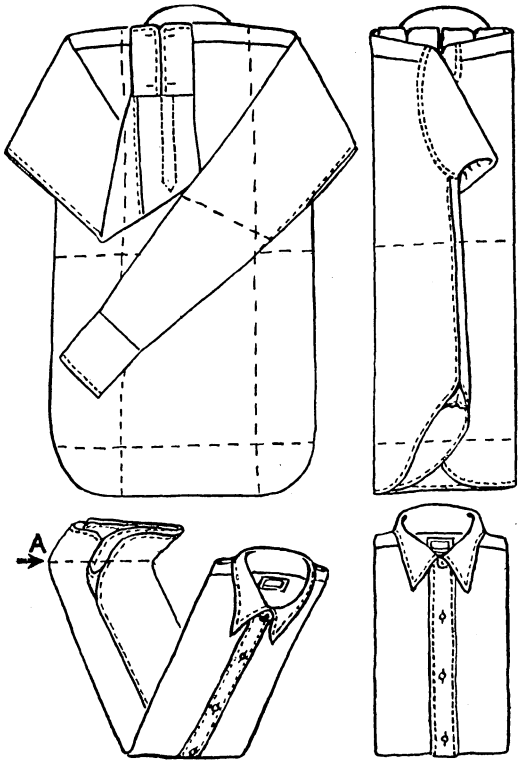

FIGURE 12.—Envelope method of folding a shirt. The part A slips between the upturned cuffs and the shirt.

Dinner napkins are folded into squares. Two folds each way are customary. These are so arranged that when the napkin is placed on the table at the left of the plate with its edge and selvage parallel to the silver and the table edge, any monogram or embroidered figure is on the outside fold. Luncheon napkins also may be folded square, following the same method, but with only one fold each way. An additional fold making an oblong is sometimes used, the monogram being placed as in the case of the dinner napkin. Luncheon napkins are sometimes folded in triangular and other shapes in order to conserve space on the table or give different effects.

Towels and pillowcases are folded lengthwise into thirds, the center third being left on the outside. The one crosswise fold is not ironed in. Handkerchiefs are often folded into a very small square. A better method is to make one fold each way in a woman's handkerchief and two folds each way in a man's handkerchief. In the woman's one more fold gives an oblong shape that some people prefer. Allow all straight pieces to dry thoroughly before piling them or putting them away.

Garments should be dried well on hangers or tne clothesrack before being folded. Two methods of folding shirts are shown in figures 12 and 13, and can be adapted to most other garments. The former method, however, adapts itself better to shirts and is more commonly

used by manufacturers. If space is available, the clotheshorse may be moved into an unused room and the frequently used garments left on it.

COLORED COTTONS AND LINENS

The general method of laundering (pp. 28 to 35) should be modified as follows for colored cottons and linens:

Do not soak colored clothes unless the colors are known to be fast. There are no effective home methods of "setting" colors; those ordinarily suggested are useless.

Handle as rapidly as possible. Use neutral soap and no strongly alkaline washing powders, unless the garments are very dirty. If the fabrics are particularly delicate, use soapbark extract instead of soap. This is prepared by placing soap-bark chips in four times as much cold water by measure, bringing to the boil, and boiling for about 30 minutes. Add water from time to time to replace what boils away, strain the resulting yellow liquid, and store in closed bottles. A little borax will aid in preserving it. If a mold forms, strain the extract again and rebottle. Do not use alkaline washing compounds with it.

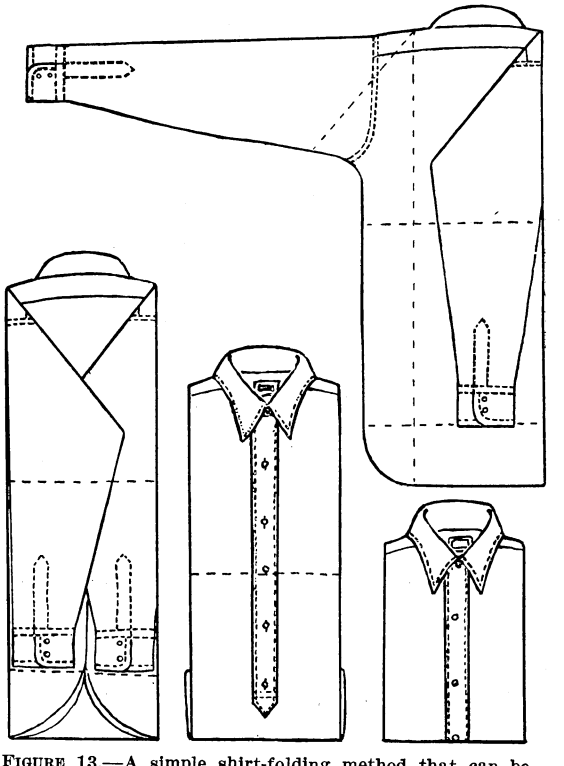

FIGURE 13.—A simple shirt-folding method that can be applied to many other garments.

White starch shows very prominently when used on dark fabrics. It may be tinted with tea or coffee for browns and with bluing for blues, or specially tinted products may be purchased.

Starch containing some gelatin is effective for light colored linen and cotton fabrics. Glue is sometimes used for dark materials. Do not use very bad-smelling glue, however, as the odor is difficult to remove from fabrics. Soak 1 ounce of the glue in a cup of warm water and boil in a double boiler until it is dissolved. If necessary add warm water in order to keep the quantity to 1 cup. Dilute according to the stiffness desired, cool the solution somewhat, and dip the garment as into ordinary starch, wiping off the excess glue with a piece of black cloth. The remaining glue can be used again. After

sprinkling, roll the garment in a black cloth and iron on a board covered with black cloth. If the glue accumulates on the surface of the iron, it can be removed by dilute acetic acid or vinegar.

Irish moss solution made by boiling one-half ounce of the moss in 2 cups of water, straining, and adding one-eighth cup of stock gelatin solution (p. 32) makes a good stiffening agent for heavy cotton garments and linen suitings.

Dry all colored garments in the shade and be sure that they are wrong side out. Take in as soon as dry.

WOOLENS

Moist wool is sensitive to rubbing and heat. Unless special precautions are taken, it becomes hard and shrunken when laundered and cannot be restored to its original condition. Weak solutions of alkalis increase this tendency, and strong ones tender and often completely dissolve the fabric. Shrinkage is increased by intense heat and also by marked changes in temperature, making it imperative that all water used be lukewarm. Woolens are often washed correctly, but rinsed in cold water, which causes a sudden contraction likely to be permanent.

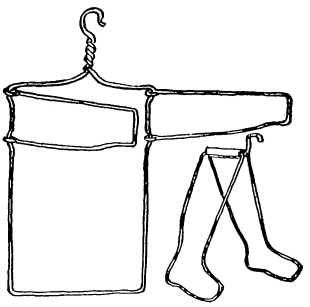

FIGURE 14.—Wire forms for drying knitted garments.

Use the general laundry method, with the following exceptions:

Measure knitted garments and any others likely to shrink, so that they may be stretched later to their original size.

If woolens are soaked at all, let it be for only a very short time.

Avoid using water that has been softened with large quantities of alkaline compounds. Use only neutral soaps and no strong washing powders. Borax and ammonia solutions are the safest assisting agents. Use soap in the form of a solution or jelly, and do not rub soap directly on the fabric. Have an abundance of lukewarm suds (about 100° F.). Use more water in proportion to bulk for wool than for any other material.

Squeeze and work in the suds without rubbing. Press out the excess water and wash in a second suds of the same temperature. Hand washing is less likely than machine washing to shrink woolens and make them lose their softness. If a machine is used, do not crowd the articles and do not agitate them for as long a period as is customary with other materials. Too long and too vigorous agitation is one cause of wool fabrics felting during laundering.

Never boil wool materials.

Squeeze them from the last suds and rinse free from soap in several changes of lukewarm water as near the temperature of the suds as possible.

Wring through a loosely set wringer, being careful not to stretch the fabric.

A dressing is sometimes needed in lightweight wool fabrics and in wool-and-cotton materials. A dilute glue solution, alone or added to clear boiled starch, may be used. If the fabric is dark it is better to omit the starch. Have the solution lukewarm, and dry the fabric

at a moderate temperature or the glue will show. Dilute solutions of gum arabic and gum tragacanth may also be used.

All wool materials should be dried in a warm place, but not near a fire or in the direct sunlight. Never allow them to freeze. Hang knitted underwear from the shoulders, shaping the garments occasionally and squeezing the water from the bottom. Spread sweaters and similar knitted garments back down with sleeves outstretched on several thicknesses of clean, soft material laid flat. Measure and shape according to the dimensions taken before the garment was wet, and pin in place if necessary. Turn occasionally after it is almost dry. The excess of water may be removed previously by placing it in a sheet suspended in cradle form, but the pad is more satisfactory. Knitted garments may be dried on forms (fig. 14).

Blankets may be placed over a line with a half or fourth on one side. The ends should be squeezed occasionally to remove the excess water. When dry, raise the nap by brushing well with a clean, stiff whisk broom, or with hand cards, such as are used for combing wool. The warmth of a blanket depends very largely upon the amount of nap.

Press wool garments while still damp with a medium-hot iron until they are dry. Use a pressing cloth. With flannels, slightly dampened cheesecloth will draw up the fluff of the material.

SILKS AND SYNTHETICS

Silks should be washed in the same manner as woolens (p. 36). Though there is less danger of shrinkage, and they are not so sensitive to alkaline solutions, silks are usually very delicate and must be handled carefully. Hand washing is preferable. If a machine is used, such garments should be placed in net bags and the machine run only a very short time.

For colored silks, the suds should be very heavy and lukewarm or even cooler (about 100° F.). There is less danger of injury to both fabric and color if soap bark (p. 35) is used instead of soap. Do not rub too hard, as the fibers may be broken or the gloss dulled. Careful squeezing or just lifting up and down in the suds is better than rubbing. Avoid strong soap and washing powders and do not twist the fabric to wring out the suds.

Rinse thoroughly in water of the same temperature, and remove the water finally by squeezing and patting between dry towels or heavy cloths. A final rinse in a bath containing a half ounce of 36-percent acetic acid to a gallon of water tends to increase the luster. Do not wrinkle silks any more than necessary. If an extractor is used special precautions are needed, as long, hard extraction produces wrinkles very difficult to remove. Gum arabic and gelatin (p. 32) are good stiffening agents for most silks. Dry them as quickly as possible, but never in the sun. Rapid drying before an electric fan prevents watermarks and assists in retaining a good finish.

Ribbons, laces, and veilings are restored very nearly to their original finish by dipping in skimmed milk or whey. Be sure the milk fat has been removed, as it forms grease spots. Stretch over a smooth surface to dry and leave unironed. The odor of milk which is first apparent on the fabric soon disappears.

Silk scorches easily, and white silk becomes yellow when pressed with a very hot iron. Use a warm iron, protecting the fabric with cheesecloth. Iron on the wrong side. The fabric should be evenly damp, but not wet. If too wet and ironed with a hot iron it is likely to be stiff and papery, and if half wet and half dry it may be spotted.

Some silk prints are not colorfast. A dress of such a fabric should be dried as quickly as possible. Squeeze out the excess water with a Turkish towel; then, being careful to keep all folds opened out, hang in the air until just evenly damp. Press on the wrong side. However, do not iron while the hems or any other thick parts are wet. This may make the colors run.

Silk taffetas may often be handled best by lifting them out of the rinse water directly onto a towel to remove most of the water. Squeezing makes lines that are hard to iron out. Iron while fairly wet since such fabrics tend to dry out before the entire garment can be ironed.

Pongees are very easily watermarked. Wet spots on the fabric become darker when they are ironed dry. To avoid such difficulties have the dampness very evenly distributed and iron on the wrong side, or iron the dry fabric. Steaming is also effective. Use a double press cloth and sufficient water to moisten the upper layer. Thus no water reaches the silk, and the steam tends to remove previously formed watermarks. Finally finish by pressing on the wrong side.

Synthetic fabrics, such as the rayons, should be laundered with the same care as silks; that is, wash in heavy lukewarm (100° F.) suds of neutral soap. Do not rub. Squeeze and rinse repeatedly until clean. A few types of rayon are weaker when wet and must be handled with particular care. Rinse in water of the same temperature as the suds in order to avoid sharp changes which increase shrinkage. Dry on a clothes hanger or by rolling in a Turkish towel. Clothespins tend to tear such materials especially if they are knitted. Synthetic fabrics made of cellulose acetate are easily scorched by hot irons. It is therefore safer to use medium heat in ironing all synthetics or to try out the iron on a portion that does not show.

LACE CURTAINS

Measure both dimensions of the curtains before laundering, in order that they may be stretched to the correct size.

Use the general method (pp. 28 to 35) with the following precautions:

Handle the curtains carefully in the suds, squeezing and working them rather than rubbing. Many curtains that appear strong have been greatly weakened by the action of light and go to pieces when washed. If a machine is used enclose the curtains in net or muslin bags.

Rinse and blue white curtains as in washing ordinary fabrics.

Cream, ecru, and brown curtains may be retinted. Add a strong solution of tea or coffee, or a combination of the two, slowly to the hot water until the desired tint is produced when tested on a piece of muslin. Brown cotton dyes can be used in very weak solutions, and should be tested on a sample for shade. Remove the curtain as soon as the desired shade is obtained.

Starch the curtains if desired (p. 31), or, better still, use gelatin or gum arabic as a stiffener.

Dry curtains in stretchers, or spread a sheet on the floor, mark off the size desired, and pin the curtains to it, stretching where necessary. Stretchers that do not form scallops where the pins are inserted are best for straight-edged curtains.

PILLOWS

Pillows may be washed without removing the feathers. Scrub in a weak washing soda solution, using a good suds. Repeat in a second suds if necessary. Rinse in lukewarm water, changing it two or three times. If an extractor is used, extract, and then dry the pillows on a sheet in a warm place, preferably in the sun. Otherwise squeeze out as much of the excess water as possible and dry in the same way. Beat the pillows from time to time during drying.

A more satisfactory method is to transfer the feathers to a muslin bag two or three times the size of the ticking by sewing the edges of the openings of the ticking and the bag together and shaking the feathers from one to the other. Wash and dry the bag of feathers in the same way as a whole pillow. After the ticking has been washed separately apply a very stiff starch mixture to the inside with a sponge to close the pores of the material and prevent the feathers from working through. Refill the ticking in the same way it was emptied.

INFECTED CLOTHES

Clothing and linen used by a person suffering with any contagious disease and handkerchiefs used during a cold need special treatment and should not be kept or washed with other clothes. Separate bags or other containers that can be sterilized or destroyed should be provided. Infected clothing may spread the disease directly to the persons who handle it or indirectly through contact with other articles. Boiling is the simplest method of sterilizing infected clothing, but the heat is likely to injure some fibers and set stains and dirt; therefore other methods are sometimes preferable. The United States Public Health Service gives the following directions for handling infected clothing:

Clothes worn by a person suffering from or exposed to a contagious disease, or bed linen, may be disinfected previous to washing by immersion in one of the following solutions for 1 hour:

A 5-percent dilution of the commercial solution of formaldehyde (formalin).

A 1-percent solution of phenol (pure carbolic acid).

A ½-percent solution of liquor cresolis compositus.

Infected clothing may also be readily sterilized by immersing in boiling water for 10 minutes.

Woolen goods may be disinfected by immersing in water maintained at a temperature of 165° F. for 20 minutes. If the goods are then carefully washed and dried, no undue shrinkage of the garments should result and the infectious agents of disease except those due to spore-forming bacteria, such as anthrax or gas gangrene, will have been destroyed.

The person who handles the infected garments should wear some form of apron to protect the clothing, and this apron should be disinfected immediately after the soiled clothes are handled. Also the hands and forearms should be thoroughly scrubbed with soap, water, and a nail brush for 10 minutes by the clock, and thoroughly rinsed in either the phenol solution or the cresolis solution mentioned above or in a 1 to 1,000 solution of bichloride of mercury.

These precautions are necessary in order to prevent the germs on the clothes being carried to the mouth of one handling the clothes or indirectly to the mouths of others.

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